

A Revision of the Taiwanese Species of the Family Ochodaeidae (Coleoptera, Scarabaeoidea)

Teruo OCHI

21–6, Kôfûdai 5-chôme, Toyono-chô, Toyono-gun, Osaka, 563–0104 Japan,

Kimio MASUMOTO

Institute of Human Living Sciences, Otsuma Women's University, Tokyo, 102–8357 Japan

and

Chun-Lin Li*

Department and Graduate Institute of Entomology, National Taiwan University,
Taipei, Taiwan 10764 R.O.C.

Abstract The Taiwanese species of the family Ochodaeidae are revised. Two new species of the genus *Ochodaeus* are described: *Ochodaeus sakaii* sp. nov., and *Ochodaeus lanyuensis* sp. nov. One species, *Ochodaeus coomani* PAULIAN, is recorded for the first time from Taiwan. A key is given to the species of the genus *Ochodaeus*.

Ochodaeus is a large genus in the family Ochodaeidae comprising about eight genera and 80 species in the world (SCHULTZ, 1988). Four species have so far been recorded from Taiwan: *O. xanthomelas* (WIEDEMANN, 1823), *Ochodaeus asahinai* KUROSAWA, 1968, *O. interruptus interruptus* KUROSAWA, 1968, and *O. formosanus* KUROSAWA, 1968. In recent years, the authors had an opportunity to examine many specimens of these beetles in the authors' collections, and also in the collections of the National Science Museum (Nat. Hist.), Tokyo, Taiwan Agricultural Research Institute, Wufeng, and National Chung Hsing University, Taichung. The authors have reached several conclusions from this examination: two species, *O. asahinai* and *O. xanthomelas*, were not ascertained as to their exact distribution in Taiwan. So far as the authors have investigated, any specimen of these species were not found. On the other hand, they found two new species and a newly recorded one, *Ochodaeus coomani* PAULIAN, 1945,

*This study is partly supported by the National Science Council, Taiwan, as the grant number NSC 95-2811-B-002-039.

among the collections. Thus, they are going to describe herein two new species and to record one species from Taiwan.

Before going further into details, the authors wish to express their cordial thanks to Dr. Wataru SUZUKI, Tokyo, and Mr. Jing-Fu TSAI, Chung Hsing University, Taichung, for offering materials, Dr. Shûhei NOMURA, National Science Museum (Nat. Hist.), Tokyo, and Mr. Hsien-Tzung SHIH, Taiwan Agricultural Research Institute, Wufeng, for permitting loan of the old specimens in their collections.

Ochodaeus coomani PAULIAN, 1945

(Figs. 1 & 6)

Ochodaeus coomani PAULIAN, 1945, Fn. Emp. fr., 3: 185. — KUROSAWA, 1968, Bull. natn. Sci. Mus., Tokyo, 11: 240.

Specimen examined. 1 ex., Liukuei, Kaohsiung Hsien, 7-VI-1976, M. KUBOTA leg.

Specimens compared. 3 exs., Cuc Phuong (330 m), L. T., Ninh Bin Prov., N. Vietnam, 2-VI-1998, S. NOMURA leg.

Distribution. Taiwan [new record], Vietnam.

Notes. This species was originally described by PAULIAN (1945, p. 185) from Hoa Binh and Saigon, Vietnam. Since then, it has not been referred to except for KUROSAWA's comment (1968, p. 240). Through the courtesy of Dr. Shûhei NOMURA, the authors were able to examine three specimens of this species from North Vietnam. As the result of their examination, it was found that the Taiwanese specimen is entirely identical with those from Vietnam.

Ochodaeus formosanus KUROSAWA, 1968

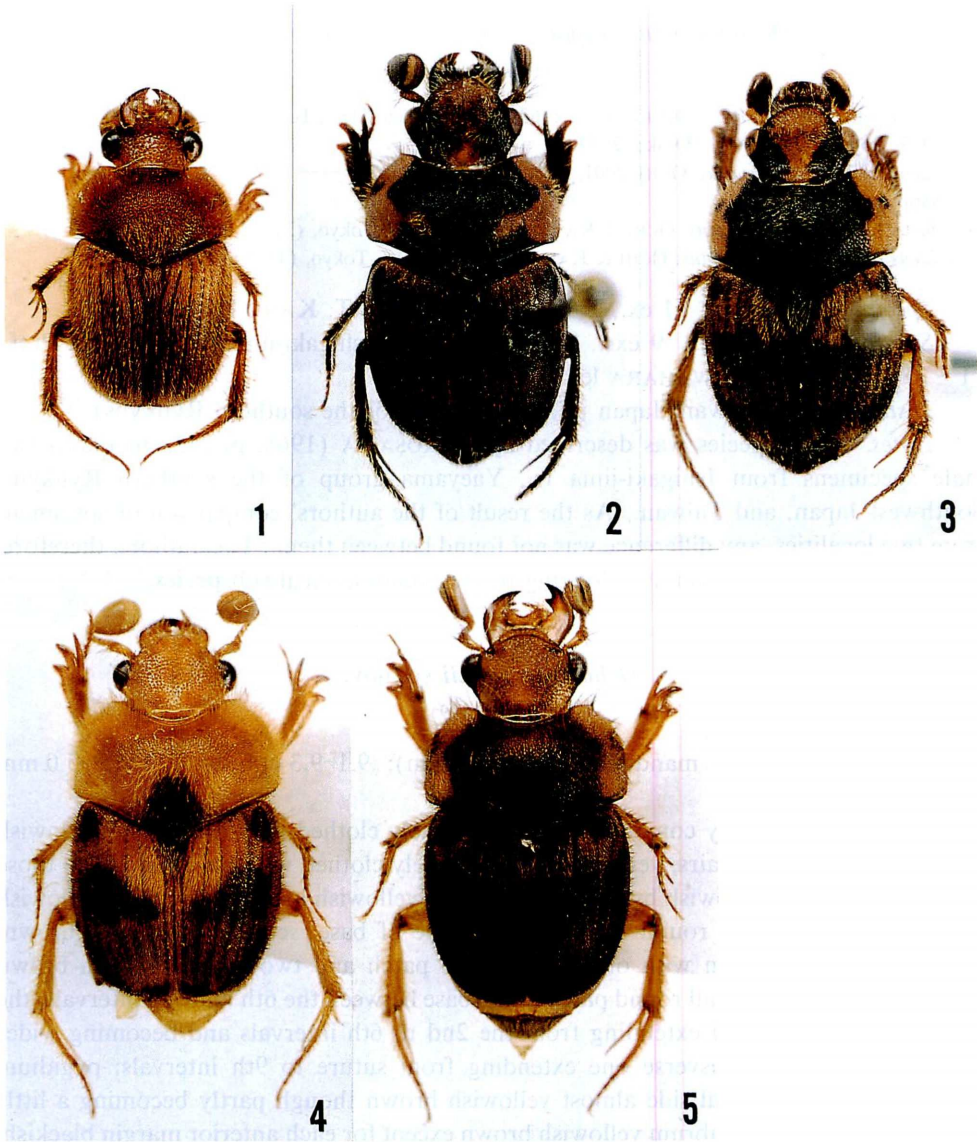
(Figs. 2 & 7)

Ochodaeus formosanus KUROSAWA, 1968, Bull. natn. Sci. Mus., Tokyo, 11: 241. — MASUMOTO, 1976, Elytra, Tokyo, 3: 3.

Specimens examined. 1♂, Baibara, Formosa, 3-IV-1926, T. KANO (Paratype); 1 ex., Habon, C. Taiwan, 25-X-1986, K. LAH leg.; 1 ex., Takesaki, Taiwan, 14-IV-1965, R. KANO leg.; 1 ex., Chuyunshan Lintao, Taiwan, 26-I-1995, C.-L. LI leg.; 4 exs., Fu-Fu Shan, Tao Yuan Co., N. Taiwan, 1~17-V-2004, C.-L. LI leg.; 1 ex., Tengjih, Kaohsiung Co., 27-V~22-VI-2005, C.-L. LI leg.

Distribution. Taiwan.

Notes. This species was originally described by KUROSAWA (1968, p. 241) based on two specimens from Taiwan. It is widely distributed in Taiwan, and the body color varies in some localities.



Figs. 1–5. Habitus of *Ochodaeus* spp. — 1, *Ochodaeus coomani* PAULIAN, male; 2, *O. formosanus* KUROSAWA, male, paratype; 3, *O. interruptus interruptus* KUROSAWA, male, paratype; 4, *O. sakaii* sp. nov., male holotype; 5, *O. lanyuensis* sp. nov., male, holotype.

Ochodaeus interruptus interruptus KUROSAWA, 1968

(Figs. 3 & 4)

Ochodaeus maculatus interruptus KUROSAWA, 1968, Bull. natn. Sci. Mus., Tokyo, 11: 243. — MASUMOTO, 1985, Coleopt. Japan Col., Osaka, 2: 350.

Ochodaeus carinatus interruptus: OCHI, 2001, Kogane, Tokyo, (2): 20. — FUJIOKA, 2001, Kogane, Tokyo, Suppl., (1): 28.

Ochodaeus kurosawai interruptus: OCHI & KAWAI: 2002, Kogane, Tokyo, (3): 52.

Ochodaeus interruptus interruptus: OCHI & KAWAI: 2003, Kogane, Tokyo, (4): 55.

Specimen examined. 1 ex., Taiwan, 14–VI–1929, T. KANO leg.

Specimens compared. 9 exs., Mt. Yarabudake, Ishigaki-jima Is., Okinawa Pref., 11–V–2005, Y. KAWAHARA leg.

Distribution. Taiwan, Japan (Yaeyama group of the southern Ryukyus).

Notes. This species was described by KUROSAWA (1968, p. 243) based on two male specimens from Ishigaki-jima Is., Yaeyama group of the southern Ryukyus, Southwest Japan, and Taiwan. As the result of the authors' comparison of specimens from two localities, any difference was not found between them. The authors, therefore, regard the Taiwanese form as belonging to the nominotypical subspecies.

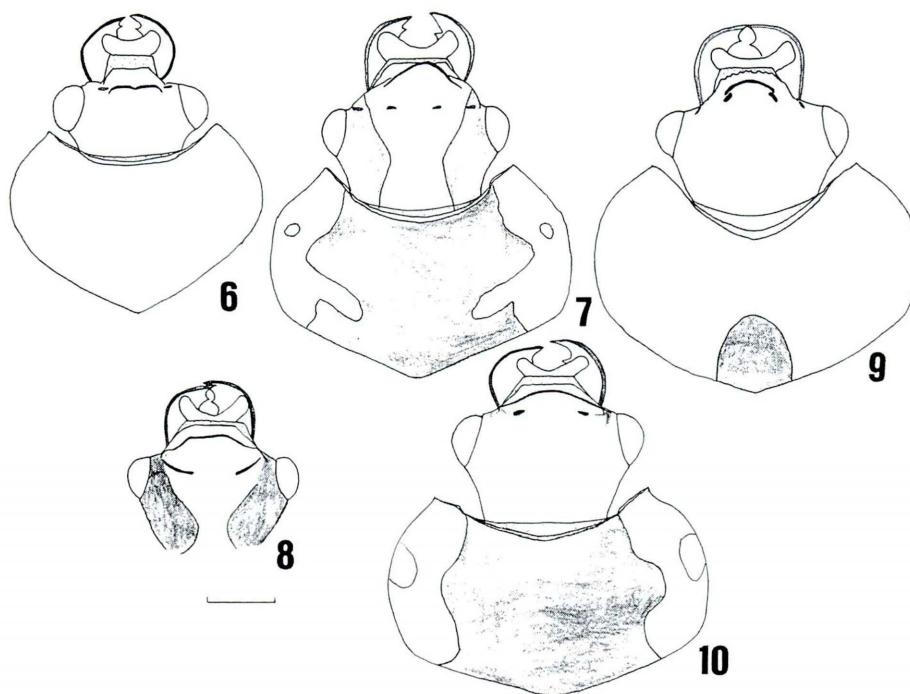
Ochodaeus sakaii sp. nov.

(Figs. 4 & 9)

Length (including mandibles and pygidium): 9.1–9.3 mm; width: 4.9–5.0 mm (n=4).

Body oval, strongly convex; dorsal side densely clothed with fairly long yellowish brown to dark brown hairs; ventral side also densely clothed with hairs similar to those on dorsum. Color yellowish brown; head entirely yellowish brown; pronotum yellowish brown with a blackish round spot at the middle of base; scutellum blackish brown; elytron yellowish brown with one small round patch and two vague blackish brown bands as follows: the small round patch at the base between the 6th and 7th intervals, the median transverse band extending from the 2nd to 6th intervals and becoming wider laterad, the apical transverse one extending from suture to 9th intervals; pygidium yellowish brown; ventral side almost yellowish brown though partly becoming a little darker; mandibles and labrum yellowish brown except for each anterior margin blackish; antennae wholly yellowish brown; legs almost yellowish brown.

Male. Head slightly transverse, slightly raised in middle; clypeus rather strongly produced forward and weakly denticulate, with a semicircular carina a little behind anterior margin, and also with a pair of steeply raised tubercles a little behind the ends of front carina; distance between two tubercles about 0.75 mm; marginal membrane of clypeus somewhat short, about 0.10 mm in length; posteriormost portion of head distinctly raised along margin, shallowly concave on both sides before the marginal elevation; surface rather shining and densely granulate; labrum widely emarginate in



Figs. 6–10. Head and pronotum. — 6, *Ochodaeus coomani* PAULIAN, male; 7, *O. formosanus* KUROSAWA, male; 8, *O. interruptus interruptus* KUROSAWA, male; 9, *O. sakaii* sp. nov.; 10, *O. lanyuensis* sp. nov., male.

front.

Pronotum well convex above, 1.83 to 1.84 times as wide as long ($n=4$), with an obtuse longitudinal impression along midline in basal half; anterior margin a little deeply emarginate in middle, and a little sinuous on both sides of the emargination, widely bordered, especially so at the middle, with rather wide marginal membrane, about 0.23 mm in length at the middle; lateral margins roundly attenuate towards each apex, finely bordered; anterior angles well produced forward, subtriangular in lateral aspect; posterior angles rounded; posterior margin obtusely angulate at the middle, clearly bordered throughout; disc evenly convex though a little depressed in median portion of base; surface densely and somewhat evenly covered with granules, which are somewhat coarse.

Elytra 1.26 to 1.28 times as wide as long ($n=4$), widest a little behind the shoulder; lateral margins gently rounded; disc with ten striae, of which one is along epipleural margin, each stria strongly and somewhat widely impressed, with stria punctures coarse and distinct; intervals weakly convex, a little densely covered with granules, which are smaller than those on pronotum.

Pygidium weakly convex, a little densely granulate. Prosternum strongly produced,

forming a sharp and decurved projection at the middle of anterior margin. Metatarsus long, with the first segment a little longer than the following four segments combined.

Type series. Holotype: ♂, Kenting Park, Pingtung Hsien, Taiwan, 3-V-1971, K. SAKAI leg. (NSMT). Paratypes: 1 ex., the same locality as for the holotype, V-1971, C.-K. YU leg.; 1 ex., Liukuei, Kaohsiung Hsien, Taiwan, 4-VI-1986, W. CHENG leg.; 1 ex., Gukuan, Taichung Hsien, V-2002, J.-F. TSAI leg. (THU).

Notes. The present new species is somewhat resembles *Ochodaeus grandiceps* FAIRMAIRE, 1897 from Sichuan, China, but can be easily distinguished from the latter by the following characteristics: 1) head with a semicircular carina a little behind anterior margin, and also with a pair of tubercles behind the carina (head with a pair of tubercles only in front, and without semicircular carina in *O. grandiceps*); 2) head slightly but distinctly raised at the middle (head entirely flat in *O. grandiceps*); 3) elytron with fifth stria ordinary, not more strongly curved than the other striae.

Ochodaeus lanyuensis sp. nov.

(Figs. 5 & 10)

Length (including mandibles and pygidium): 7.9–10.3 mm; width: 4.0–4.8 mm (n=8).

Body oval, rather strongly convex dorsad; dorsal side densely clothed with fairly long dark brown hairs, which partly become paler in color; ventral side also densely clothed with similar hairs as on dorsum. Color dirty yellowish brown; head almost yellowish brown, often becoming a little darker towards base; pronotum black to dark brown, with a pair of large yellowish brown vague stripes on sides, and with a small vague median spot a little behind anterior margin, all the yellowish stripes and/or spot sometimes almost reduced; scutellum black; elytron almost blackish brown to wholly black, sometimes with vague dark reddish transverse bands near base and a little behind the middle; pygidium blackish brown; ventral side almost yellowish brown, but partly a little darker; mandibles and labrum each yellowish brown except for anterior margin blackish; antennae with foot-stalks yellowish brown, sometimes becoming a little darker in color, club segments pale yellowish brown; legs almost yellowish brown.

Head more transverse than in the preceding species, very slightly raised in middle; clypeus a little produced forward with anterior margin very distinctly trapezoidal in outline, symmetrical, and straight in the middle, with a gently procurved, transverse, and rather long carina a little behind anterior margin, also with a pair of slight tubercles behind ends of the carina; the interspace between two tubercles about 1.00 mm; clypeal marginal membrane rather long, about 0.15 mm in length; posteriormost portion of head weakly raised at the middle, antero-lateral portions of the elevation shallowly concave; surface slightly micro-granulose and less shining; labrum a little deeply emarginate in front.

Pronotum well convex above, 1.80 to 1.92 times as wide as long (n=8), with an obtuse longitudinal impression along midline in basal half; anterior margin rather

shallowly emarginate in the middle, and slightly sinuous on both sides of the emargination, a little widely bordered, particularly so at the middle, with rather wide marginal membrane, about 0.20 mm in length at the middle; lateral margins roundly attenuate towards each apex, finely bordered; anterior angles a little produced forward, subtriangular in lateral aspect; posterior angles rounded; posterior margin obtusely angulate at the middle, distinctly bordered throughout; disc evenly convex though a little depressed at the median portion of base; surface densely and somewhat evenly covered with granules, which are a little coarser and denser than in the preceding species.

Elytra about 1.24 to 1.27 times as wide as long ($n=8$), widest a little before the middle, lateral margins gently rounded; disc with ten striae including the one along epipleural margin, each stria strongly and not so widely impressed, with strial punctures rather coarse and distinct, and moderately dense; intervals convex, densely covered with granules, which are slightly but more distinctly crowded than in the preceding species.

Pygidium slightly convex, densely granulate, the granules a little denser than in the preceding species. Prosternum strongly produced, forming a sharp and decurved point at the middle of anterior margin. Protibia with three external teeth, the 2nd tooth not distinctly sinuous posteriorly. Metatarsus long, with the first segment a little longer than the following four segments combined.

F e m a l e. Very similar to male, but the two tubercles on the head are weaker and less remarkable, and the clypeal carina is less strongly raised. Protibia with the 2nd tooth distinctly sinuous posteriorly.

Type series. Holotype: ♂, Lanyu Is., Taitung Hsien, Taiwan, 2-V-2005, K. MASUMOTO, J.-F. TSAI & W.-C. CHEN leg. (NMNST). Paratypes: 5 exs., the same data as for the holotype; 2 exs., Hongtou-Yeyou, Lanyu Is., 27~29-III-2004 (collected by FIT), W. SUZUKI leg.

Notes. The present new species somewhat resembles *Ochodaeus decoratus* ARROW, 1904, from Penang Is., off the Malay Peninsula, but can be easily distinguished from the latter by the following characteristics: 1) head with an obviously long and gently procurved carina and also with a pair of tubercles behind the carina (head with a shorter and strongly procurved carina and without a pair of tubercles behind the carina in *O. decoratus*); 2) clypeus rather short and less produced forwards instead of being long and well produced forwards; 3) pronotum with anterior margin rather deeply emarginate (distinctly shallowly emarginate in the middle in *O. decoratus*); 4) body more weakly convex instead of being strongly convex.

Key to the Species of the Genus *Ochodaeus* from Taiwan

- 1(2) Head distinctly short and very transverse; clypeus also short, trapezoidal in outline, slightly produced forward, with a strong transverse carina a little behind the level of anterior margin of eye; the carina strongly elevated, very slightly notched at the middle. Body almost wholly reddish brown to dark brown though the elytra are a little darkened apicad. 6.5–7.1 mm. Taiwan [new

- record], Vietnam. *Ochodaeus coomani* PAULIAN
- 2(1) Head neither distinctly short nor very transverse; clypeus not so short, more or less produced forward, without strong transverse carina a little behind the level of anterior margin of eye. Body mostly bicolored, rarely almost wholly reddish brown to yellowish brown.
- 3(4) Head with a curved carina on clypeus which is rather asymmetrical, and with a pair of small tubercles in a transverse row along the level of anterior margin of eye, with interspace between two tubercles about 0.5 mm. Body usually bicolored. 7.6–9.8 mm. Taiwan. *Ochodaeus formosanus* KUROSAWA
- 4(3) Head with a curved carina on clypeus which is almost symmetrical and mostly parabolic, without a pair of small tubercles in a transverse row along the level of the anterior margin of eye, with interspace between tubercles about 0.5 mm.
- 5(6) Head with a pair of short oblique transverse carinae which arise from each antennal insertion; anterior portion without a pair of distinct tubercles. Pronotum with anterior margin not thickly membranous, the membrane very slightly broader than marginal border at the middle. 7.0–11.0 mm. Taiwan, Southwest Japan (Yaeyama group of the southern Ryukyus)
 *Ochodaeus interruptus interruptus* KUROSAWA
- 6(5) Head without a pair of short oblique transverse carinae which arise from each antennal insertion. Pronotum with anterior margin thickly membranous, the membrane clearly broader than marginal border at the middle.
- 7(8) Head with a very strongly procurved and short transverse carina on clypeus, and with a pair of strongly raised tubercles a little behind each end of the carina. Pronotum with anterior margin strongly and deeply emarginate at the middle; marginal line of anterior margin becoming much wider at the middle, with marginal membrane fairly broad at the middle. Body distinctly bicolored. 9.1–9.3 mm. Taiwan. *Ochodaeus sakaii* sp. nov.
- 8(7) Head with a gently procurved and transverse carina on clypeus, and with a pair of slight and not strongly raised tubercles a little behind each end of the carina. Pronotum with anterior margin strongly but not so deeply emarginate at the middle; marginal line and marginal membrane almost of the same breadth as in the preceding species. Body bicolored, but almost wholly darker. 7.9–10.5 mm. Taiwan (Lanyu Is.) *Ochodaeus lanyuensis* sp. nov.

Doubtful Records

Ochodaeus asahinai KUROSAWA, 1968

Ochodaeus asahinai KUROSAWA, 1968, Bull. natn. Sci. Mus., Tokyo, 11: 240. — NOMURA, 1973, Ent. Rev. Japan, Osaka, 25: 45 (Ishigaki, Taiwan). — MASUMOTO, 1976, Elytra, Tokyo, 3: 3; 1985, Coleopt. Japan Col., Osaka, 2: 350. — ISHIDA & FUJIOKA, 1988, Lamellicornia, Tokyo, Suppl., (2): 13. — OCHI, 2001, Kogane, Tokyo, (2): 16.

Ochodaeus maculatus WATERHOUSE, 1875

Ochodaeus maculatus WESTWOOD [sic]: MIWA, 1939, Cat. Coleopt. Japon., Scarabaeidae, (5): 28.

要 約

越智輝雄・益本仁雄・李 春霖: 台湾産アカマダラセンチコガネ科の再検討. —— 台湾に分布するアカマダラセンチコガネ科について, 国立科学博物館(東京), 台湾農業試験場(霧峰)などに所蔵されている戦前の古い標本, 戦後に採集された標本, さらに近年, 著者らが採集調査を実施して得られた標本を検討した. その結果, 台湾には4種, *Ochodaeus coomani* PAULIAN, 1945 (新分布), *O. formosanus* KUROSAWA, 1968, *O. sakaii* sp. nov., *O. lanyuensis* sp. nov. が分布していることが明らかになった.

なお, 野村(1973)が記録した *Ochodaeus asahinai* KUROSAWA, 1968 は, 実は台湾に分布していないと考えられる. おそらく, 今回初めて台湾より記録した *O. coomani* PAULIAN, 1945 の誤認だろう. また, 三輪(1939)のカタログに *O. maculatus* 'WESTWOOD', 1875 が記録されているが, これは日本産の *Ochodaeus maculatus* WATERHOUSE, 1875 が台湾産として記録されてしまったか,あるいは台湾に分布する種で, 背面が黄白色で黒紋のある種をさしている可能性がある.

References

- ARROW, G., 1904. Sound-production in the lamellicorn beetles. *Trans. ent. Soc. London*, **1904**: 709–750.
- FAIRMAIRE, L., 1897. Coléoptères du Szu-Tchouen et de Kouï-Tcheou (Chine). *Not. Leyden Mus.*, **19**: 241–249.
- FUJIOKA, M., 2001. A list of Japanese lamellicornia. *Kogane Suppl., Tokyo*, (1): 1–293.
- KUROSAWA, Y., 1968. A revision of the subfamily Ochodaeinae in the Loo-choos, Formosa, and their adjacent regions (Coleoptera, Scarabaeidae). *Bull. natn. Sci. Mus., Tokyo*, **11**: 235–243.
- MASUMOTO, K., 1976. A revision of the coprophagid-beetles from Formosa [1]. *Elytra, Tokyo*, **3**: 1–8.
- 1985. Trogidae, Scarabaeidae (Hybosorinae, Geotrupinae, Aphodiinae). In: UENO, S.-I, Y. KUROSAWA & M. SATÔ (eds.), *The Coleoptera of Japan in Color*, **2**: 348–354, 364–379 [incl. pls. 66 & 67]. Hoikusha, Osaka. (In Japanese, with English book title.)
- MIWA, Y., & M. CHÛJÔ, 1939. Catalogus Coleopterorum Japonicorum Scarabaeidae, **5**: 1–94. Noda-Shobô, Taihoku.
- NOMURA, S., 1973. Notes on the coprophagous Lamellicornia from Taiwan. *Ent. Rev. Japan, Osaka*, **25**: 37–52.
- OCHI, T., 2001. Taxonomic notes on some Japanese coprophagous lamellicorn beetles (Coleoptera, Scarabaeoidea) II. The genus *Ochodaeus* SERVILE (Ochodaeidae). *Kogane, Tokyo*, (2): 15–22.
- & S. KAWAI, 2002. Taxonomic notes on some Japanese coprophagous lamellicorn beetles (Coleoptera, Scarabaeoidea) IV. Homonym of the genus *Ochodaeus* SERVILE (Ochodaeidae). *Ibid.*, (2): 15–22.
- & ——— 2003. On the species and subspecies names of *Ochodaeus interruptus* KUROSAWA (Coleoptera, Ochodaeidae). *Ibid.*, (4): 55–56.
- PAULIAN R., 1945. Coléoptères Scarabéides de l'Indochine. *Faune de l'Empire Français*, **3**: 1–228, 1 map.
- WATERHOUSE, C. O., 1875. On the lamellicorn Coleoptera of Japan. *Trans. ent. Soc. London*, **1875**: 71–116.
- WIEDEMANN, C. R. W., 1823. Zweihundert neue Käfer von Java, Bengalen und den Vorgebirge der guten Hoffnung. *Zool. Mag., Altona*, **2**(1): 1–135.